

## PATENT COOPERATION TREATY

## PCT

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INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY  
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 00837-02		FOR FURTHER ACTION	See Form PCT/IPEA/416																								
International application No. PCT/US03/36035		International filing date (day/month/year) 12 November 2003 (12.11.2003)	Priority date (day/month/year) 12 November 2002 (12.11.2002)																								
International Patent Classification (IPC) or national classification and IPC IPC(7): B32B 15/04; F03B 3/12; B29C 9/00; C23C 8/00, 16/00; and US Cl.: 428/ 623,629,633,698,679,680,141; 427/567,566,585,596,255.32,255.36; 118/723EB,726; 416/241B,241R																											
Applicant UNIVERSITY OF VIRGINIA PATENT FOUNDATION																											
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>5</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> (sent to the applicant and to the International Bureau) a total of _____ sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>																											
<p>4. This report contains indications relating to the following items:</p> <table> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. I</td> <td>Basis of the report</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. II</td> <td>Priority</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. III</td> <td>Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. IV</td> <td>Lack of unity of invention</td> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td>Box No. V</td> <td>Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VI</td> <td>Certain documents cited</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VII</td> <td>Certain defects in the international application</td> </tr> <tr> <td><input type="checkbox"/></td> <td>Box No. VIII</td> <td>Certain observations on the international application</td> </tr> </table>				<input checked="" type="checkbox"/>	Box No. I	Basis of the report	<input type="checkbox"/>	Box No. II	Priority	<input type="checkbox"/>	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability	<input type="checkbox"/>	Box No. IV	Lack of unity of invention	<input checked="" type="checkbox"/>	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement	<input type="checkbox"/>	Box No. VI	Certain documents cited	<input type="checkbox"/>	Box No. VII	Certain defects in the international application	<input type="checkbox"/>	Box No. VIII	Certain observations on the international application
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Date of submission of the demand 10 June 2004 (10.06.2004)		Date of completion of this report 29 January 2005 (29.01.2005)																									
Name and mailing address of the IPEA/ US Mail Stop PCT, Attn: IPEA/US Commissioner for Patents P.O. Box 1450 Alexandria, Virginia 22313-1450 Facsimile No. (703) 305-3230		Authorized officer Deborah Jones  Telephone No: 703-308-0661																									

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.

PCT/US03/36035

## Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

This report is based on translations from the original language into the following language \_\_\_\_\_, which is the language of a translation furnished for the purposes of:

international search (under Rules 12.3 and 23.1(b))  
 publication of the international application (under Rule 12.4)  
 international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):

the international application as originally filed/furnished

the description:  
 pages 1-24 as originally filed/furnished  
 pages\* NONE received by this Authority on \_\_\_\_\_  
 pages\* NONE received by this Authority on \_\_\_\_\_

the claims:  
 pages 25-44 as originally filed/furnished  
 pages\* NONE as amended (together with any statement) under Article 19  
 pages\* NONE received by this Authority on \_\_\_\_\_  
 pages\* NONE received by this Authority on \_\_\_\_\_

the drawings:  
 pages 1/9-9/9 as originally filed/furnished  
 pages\* NONE received by this Authority on \_\_\_\_\_  
 pages\* NONE received by this Authority on \_\_\_\_\_

a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3.  The amendments have resulted in the cancellation of:

the description, pages \_\_\_\_\_  
 the claims, Nos. \_\_\_\_\_  
 the drawings, sheets/figs \_\_\_\_\_  
 the sequence listing (specify): \_\_\_\_\_  
 any table(s) related to the sequence listing (specify): \_\_\_\_\_

4.  This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

the description, pages \_\_\_\_\_  
 the claims, Nos. \_\_\_\_\_  
 the drawings, sheets/figs \_\_\_\_\_  
 the sequence listing (specify): \_\_\_\_\_  
 any table(s) related to the sequence listing (specify): \_\_\_\_\_

\* If item 4 applies, some or all of those sheets may be marked "superseded."

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.  
PCT/US03/36035

## Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims 1,4,16,17,58,61-65,69,70	YES
	Claims 2,3,5-15,18-29,59,60,66-68,71	NO
Inventive Step (IS)	Claims NONE	YES
	Claims 1-71	NO
Industrial Applicability (IA)	Claims 1-71	YES
	Claims NONE	NO

## 2. Citations and Explanations (Rule 70.7)

Claims 1, 4, 16, 17, 58, 61-65, 69, and 70 lack novelty under PCT Article 33(2) as being anticipated by Skelly et al (US 5,419,971). Skelly teaches an enhanced thermal barrier coating comprising a substrate, a bond coat, and a coating thereon comprising zirconia. The zirconia may be deposited via thermal spray or vapor deposition. The thermal barrier may be columnar and recesses may be formed in the substrate. The thermal barrier may extend into the recesses thereby providing gaps between the grains.

Claims 1, 4, 58, 64, 65, 69, and 70 lack novelty under PCT Article 33(2) as being anticipated by Bruce et al (US 5,683,825). Bruce teaches a thermal barrier coating comprising a substrate, a bond coat, and a thermal barrier thereon. The thermal barrier may comprise zirconia. The zirconia may be deposited by APS, or EBPVD.

Claims 1-71 lack an inventive step under PCT Article 33(3) as being obvious over Skelly et al (US 5,419,971) in view of Wadley et al (US 5,736,073) or Wadley et al (US 5,532,314). Skelly teaches a thermal barrier system as discussed above but does not specify the manner in which the layers may be deposited. Wadley teaches a process for vapor depositing a coating on a substrate including directed vapor deposition. It would have been obvious to one of ordinary skill in the art at the time of the invention to deposit the layers of Skelly via directed vapor deposition to gain the benefits of a continuous process, automation, reliability, and decreased cost.

Claims 1-71 lack an inventive step under PCT Article 33(3) as being obvious over Bruce et al (US 5,683,825) in view of Wadley et al (US 5,736,073) or Wadley et al (US 5,532,314). Bruce teaches a thermal barrier system as discussed above but does not specify the manner in which the layers may be deposited. Wadley teaches a process for vapor depositing a coating on a substrate including directed vapor deposition. It would have been obvious to one of ordinary skill in the art at the time of the invention to deposit the layers of Bruce via directed vapor deposition to gain the benefits of a continuous process, automation, reliability, and decreased cost.

Claims 1-71 lack an inventive step under PCT Article 33(3) as being obvious over Skelly et al (US 5,419,971) in view of Bruce et al (US 6,054,184). Skelly teaches a thermal barrier system as discussed above but does not specify the manner in which the layers may be deposited. Bruce teaches a process for vapor depositing a coating on a substrate. It would have been obvious to one of ordinary skill in the art at the time of the invention to deposit the layers of Skelly via the method of Bruce '184 to gain the benefits of a accurate control of the thickness and number of the layers.

Claims 1-71 lack an inventive step under PCT Article 33(3) as being obvious over Bruce et al (US 5,683,825) in view of Bruce et al (US 6,054,184). Bruce '825 teaches a thermal barrier system as discussed above but does not specify the manner in which the layers may be deposited. Bruce teaches a process for vapor depositing a coating on a substrate. It would have been obvious to one of ordinary skill in the art at the time of the invention to deposit the layers of Bruce '825 via the method of Bruce '184 to gain the benefits of a accurate control of the thickness and number of the layers.

Claims 1-71 meet the criteria set out in PCT Article 33(4), and thus have industrial applicability because the subject matter claimed can be made or used in industry.

## ----- NEW CITATIONS -----

**INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY**

International application No.

PCT/US03/36035

**Supplemental Box Relating to Sequence Listing****Continuation of Box No. I, item 2:**

1. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion was established on the basis of:

**a. type of material**

a sequence listing  
 table(s) related to the sequence listing

**b. format of material**

in written format  
 in computer readable form

**c. time of filing/furnishing**

contained in the international application as filed  
 filed together with the international application in computer readable form  
 furnished subsequently to this Authority for the purposes of search and/or examination  
 received by this Authority as an amendment\* on \_\_\_\_\_

2.  In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

**3. Additional comments:**

\* If item 4 in Box No. I applies, the listing and/or table(s) related thereto, which form part of the basis of the report, may be marked "superseded."

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.  
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**Supplemental Box**

In case the space in any of the preceding boxes is not sufficient.

Continuation of: